Mapping

In This Section Students Will Learn To

- Describe the purpose of mapping
- Use a spreadsheet to document mapping

Mapping…

- Associates exchange model concepts and structures to NIEM types and elements
- Identifies those parts from the exchange model that do not readily fit into NIEM
  - Missing or incomplete types and elements
- Should be IEPD specific

Mapping Purpose

- Mapping output facilitates the construction of exchange schemas
  - Defines extensions to NIEM
- Mapping output serves as 'roadmap' for the implementer
  - Explicitly shows where and how business elements are represented in the IEP.

Mapping to NIEM

- To build schema, each class/property in the exchange model must be mapped to a type/element in NIEM
- Capture all business rules; sometimes
  - Mapping can be represented in path-like notation
  - It can only be described in prose
- Sometimes exchange concepts are missing from NIEM
  - These are mapped to elements in an extension schema

The Mapping "Golden" Rule

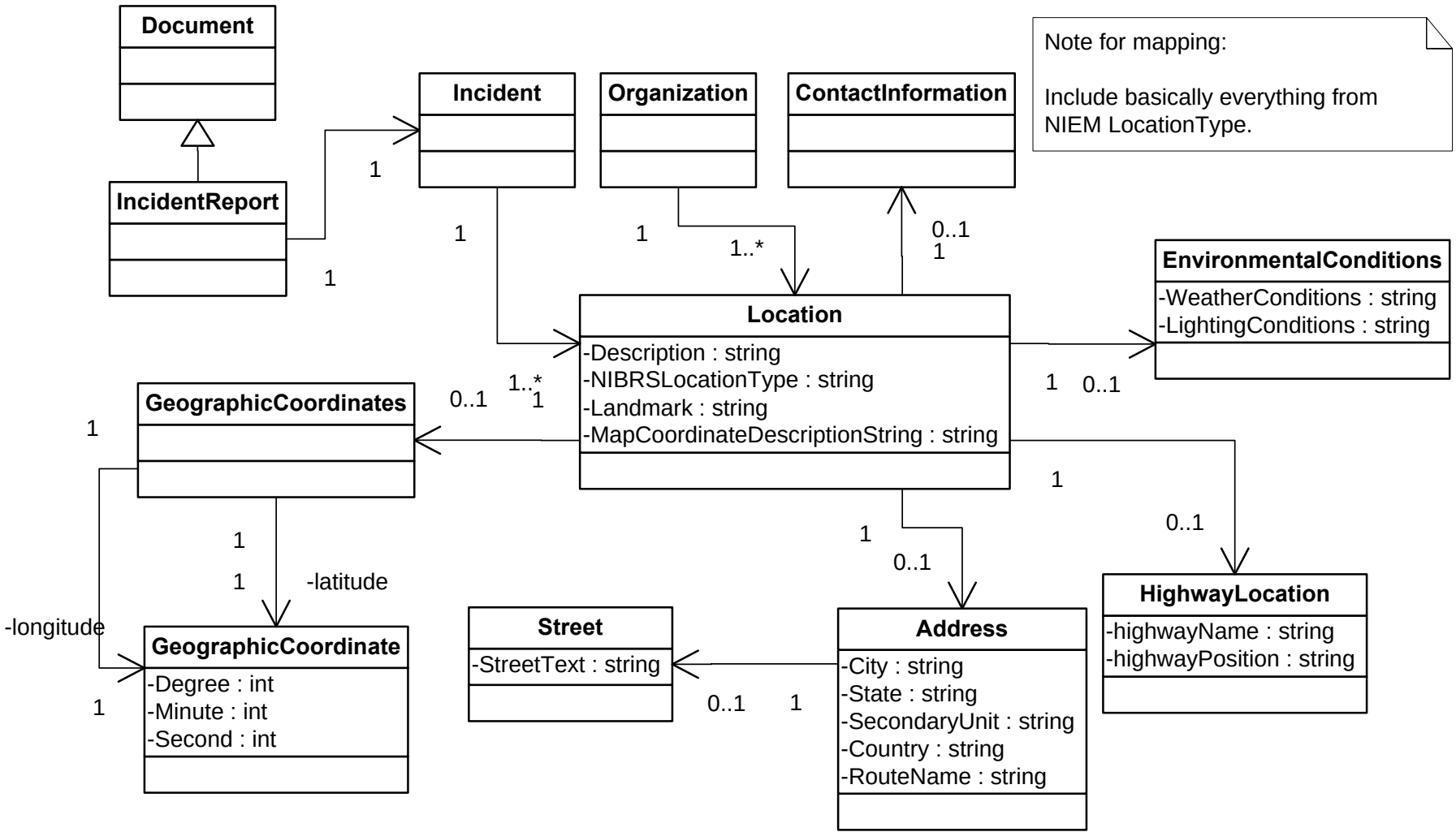
- Preserve semantic meaning and structure of your exchange model
  - Force fitting
    - Corrupts semantic integrity of Data Model
    - Makes it harder for understanding of your exchange later on
    - Increases chances for corrupting data integrity over time
    - Must be avoided

Mapping Tools

- NIEM exploration tools
  - NIEM spreadsheet
  - Graphical browser
  - SSGT
- Documentation tools
  - Spreadsheets work well for documenting mapping
    - Not the only way, but in widespread use

Business Class	Business Element	NIEM Element	IEP Path
Person	First Name	u:PersonGivenName	u:Person/u:PersonName/u:PersonGivenName
Person	Last Name	u:PersonSurName	u:Person/u:PersonName/u:PersonSurName

Example—Exchange Model Segment

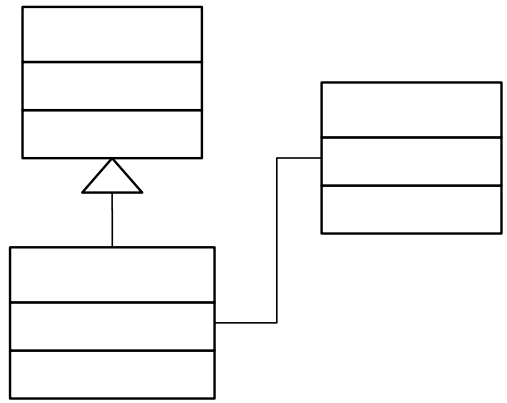


Semantic Definitions

- Here are a few semantic definitions that will relate to our mapping
  - Incident
    - An activity describing an event that occurred
  - Location
    - A description of a physical place
  - Environmental Conditions
    - A structure describing all environmental conditions associated with a given location
  - Weather Conditions
    - A description of the atmospheric conditions

Example 1

- Most exchanges will derive from DocumentType
  - Your model will always have a base class that corresponds to the root
    - In our example, IncidentReport is a new class that extends DocumentType
    - We are calling our local namespace "**loc**"



Business Class	Business Element	NIEM Element	Ext	IEP Path	Notes
IncidentReport		loc:IncidentReport	√	loc:IncidentReport	Derived from u:DocumentType
IncidentReport	Incident	c:Incident		loc:IncidentReport/c:Incident	

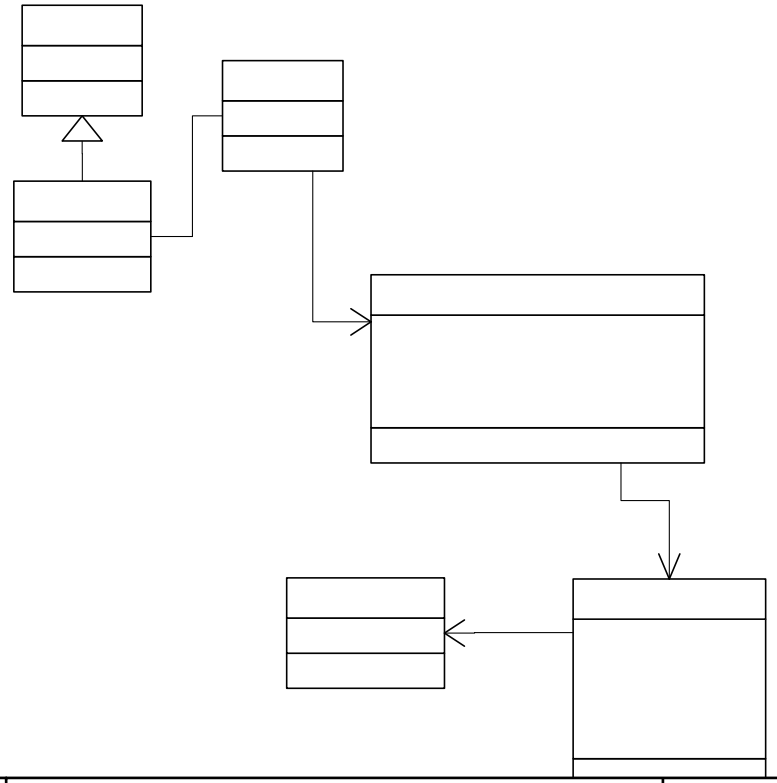
The incident could be either from the "c" or "j" namespace. It is "c" because its semantic definition is more correct to that in our exchange model.

Direct Mapping

- The majority of items will map into NIEM elements without much thought
  - Name
  - Address
- Generally found with one of 3 ways
  - Name Search
  - Definition Search
  - Can also be inferred by looking at NIEM inheritance hierarchy

Example 2 - I

- Map ‘Location’
- Map ‘Address’
- Map ‘SecondaryUnit’
- Map ‘Landmark’



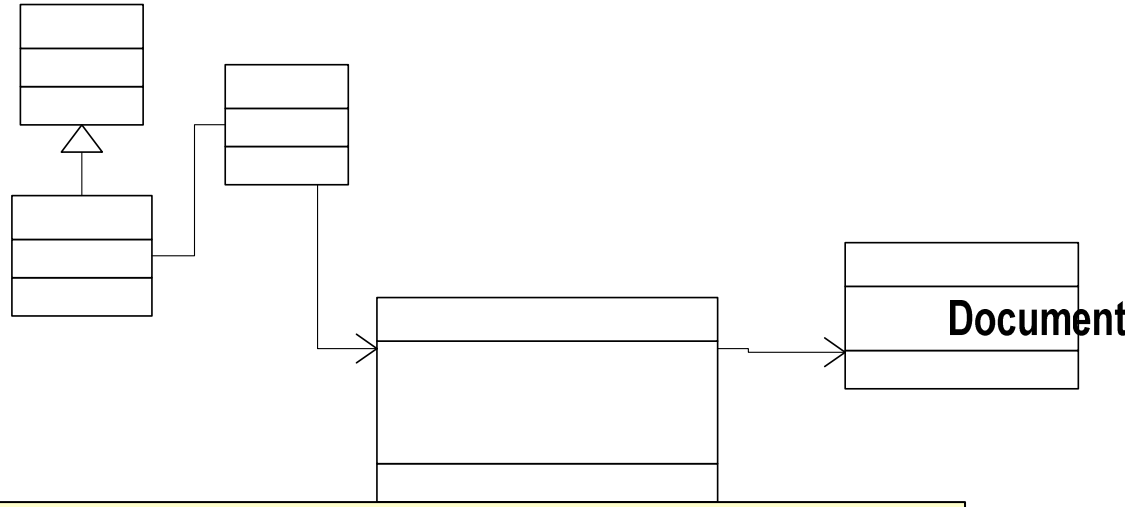
Business Class	Business Element	NIEM Element	Ext	IEP Path	Notes
Incident	Location	c:IncidentLocation		loc:IncidentReport/c:Incident/c:IncidentLocation	
Location	Landmark	c:LocationLandmarkText		loc:IncidentReport/cIncident/c:IncidentLocation/c:LocationLandmarkText	
Location	Address	u:LocationAddress		loc:IncidentReport/c:Incident/c:IncidentLocation/u:LocationAddress	
Address	SecondaryUnit	u:LocationSecondaryUnitText		loc:IncidentReport/c:Incident/c:IncidentLocation/u:LocationAddress/u:LocationSecondaryUnitText	

Additional Considerations

- Project architectural choices **will** influence mapping
  - Interface decisions
    - Concrete typing
    - Type substitution
- Most often will affect whether cascading extensions are required
  - Required with concrete typing

Example 3: No Direct/Inadequate Mapping - I

- Some have no direct or inadequate mappings
  - Must add by extending the NIEM
  - This example is extending using Dynamic Type Substitution



Description of a type needing extension with some detail explaining. Because it is a type, it does not need a path specified.

Business Class	Business Element	NIEM Element	...xt	IEP Path	Notes
Location		loc:LocationType	√		Define new element called LocationEnvironmentConditions
Location	EnvironmentalConditions	loc:LocationEnvironmentalConditions	√	loc:IncidentReport/c:Incident/c:IncidentLocation/loc:LocationEnvironmentalConditions	Define new container for environmental conditions

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For Incident, the lowest common namespace (with respect to the layer diagram shown in the technical overview) is Common.

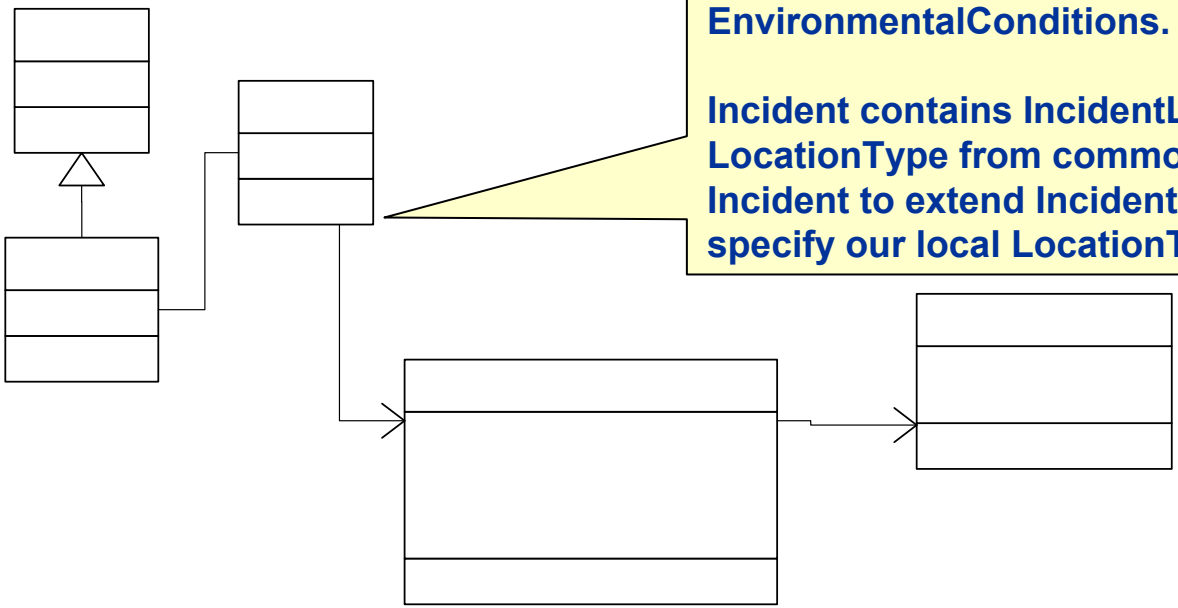
Example 3: No Direct/Inadequate Mapping - II

- NIEM has the following possibilities relating to weather conditions:
  - j:DrivingIncidentWeatherDescriptionText
  - j:CrashWeatherConditionCode
  - j:IncidentWeatherCode
- j:DrivingIncidentWeatherDescriptionText is best fit

Business Class	Business Element	NIEM Element	Ext	IEP Path	Notes
Environmental Conditions	Weather Condition	j:DrivingIncidentWeather DescriptionText	√	loc:IncidentReport/c:Incident/c :IncidentLocation/loc:Environ mentalConditions/j:DrivingInci dentWeatherDescriptionText	Include DrivingIncidentWeatherDe scriptionText from justice in EnvironmentalConditions

Example 4: Cascade Mapping - I

- If interface requires concrete typing
  - Must extend all used exchange model references to Location to use extended type



Example 4: Cascade Mapping - II

- If interface requires concrete typing
  - Must extend all used exchange model references to Location to use extended type
  - Must change previous mapping of the following items:

Business Class	Business Element	NIEM Element	Ext	IEP Path	Notes
Incident		loc:Incident	√	loc:IncidentReport/loc:Incident	Extend IncidentType to reference loc:EnvironmentalConditions

Example 4: Cascade Mapping - III

- Update the appropriate paths:

Business Class	Business Element	NIEM Element	Ext	IEP Path	Notes
Incident	Location	c:IncidentLocation		loc:IncidentReport/loc:Incident/loc:IncidentLocation	
Location	Landmark	c:LocationLandmarkText		loc:IncidentReport/loc:Incident/loc:IncidentLocation/c:LocationLandmarkText	
Location	Address	u:LocationAddress		loc:IncidentReport/loc:Incident/loc:IncidentLocation/u:LocationAddress	
Address	SecondaryUnit	u:LocationSecondaryUnitText		loc:IncidentReport/loc:Incident/loc:IncidentLocation/u:LocationAddress/u:LocationSecondaryUnitText	

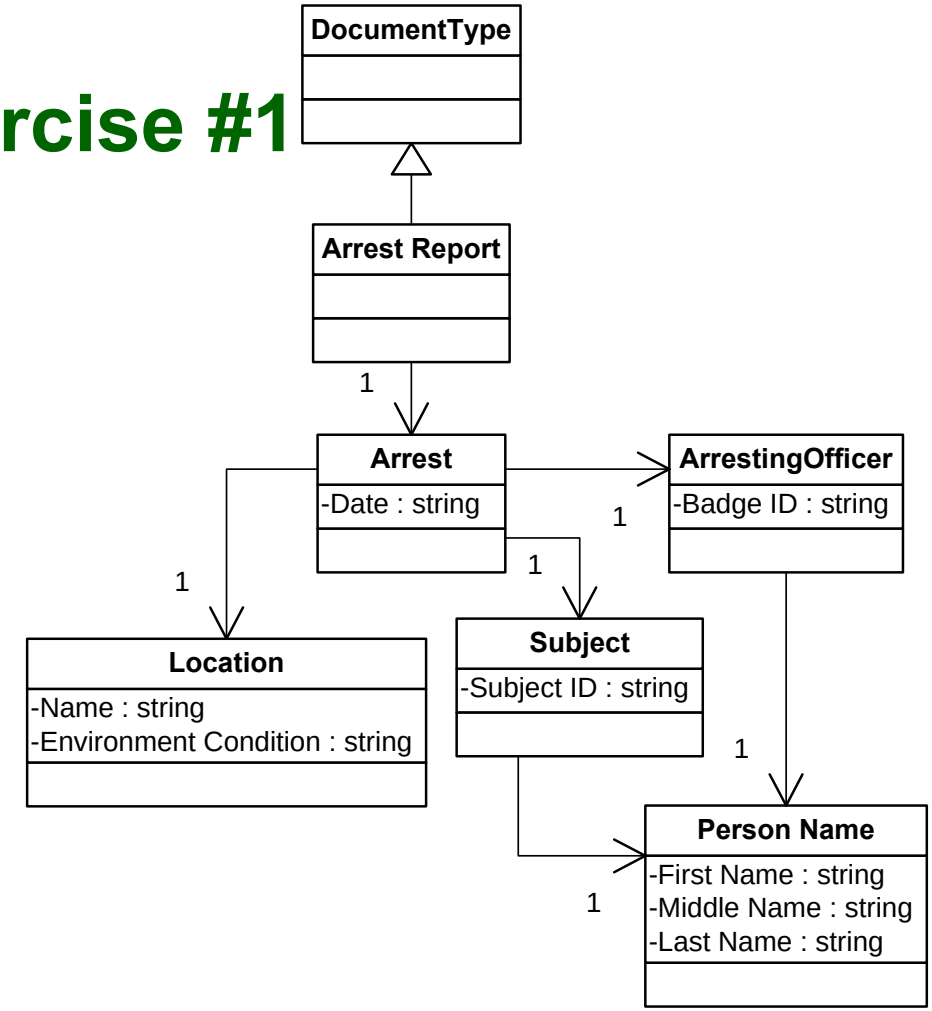
Example 4: Cascade Mapping - IV

- Update the remaining paths:

Business Class	Business Element	NIEM Element	Ext	IEP Path	Notes
Location	Environmental Conditions	loc:LocationEnvironmentalConditions	√	loc:IncidentReport/loc:Incident/loc:IncidentLocation/loc:LocationEnvironmentalConditions	Define new container for environmental conditions
Environmental Conditions	Weather Condition	j:DrivingIncidentWeatherDescriptionText	√	loc:IncidentReport/loc:Incident/loc:IncidentLocation/loc:EnvironmentalConditions/j:DrivingIncidentWeatherDescriptionText	Include DrivingIncidentWeatherDescriptionText from justice in EnvironmentalConditions

Mapping Practical Exercise #1

- Show mapping for
  - Arrest Report
  - Arrest
  - Arresting Officer
  - Arresting officer's Badge ID
    - The physical alphanumeric number on a police officers badge



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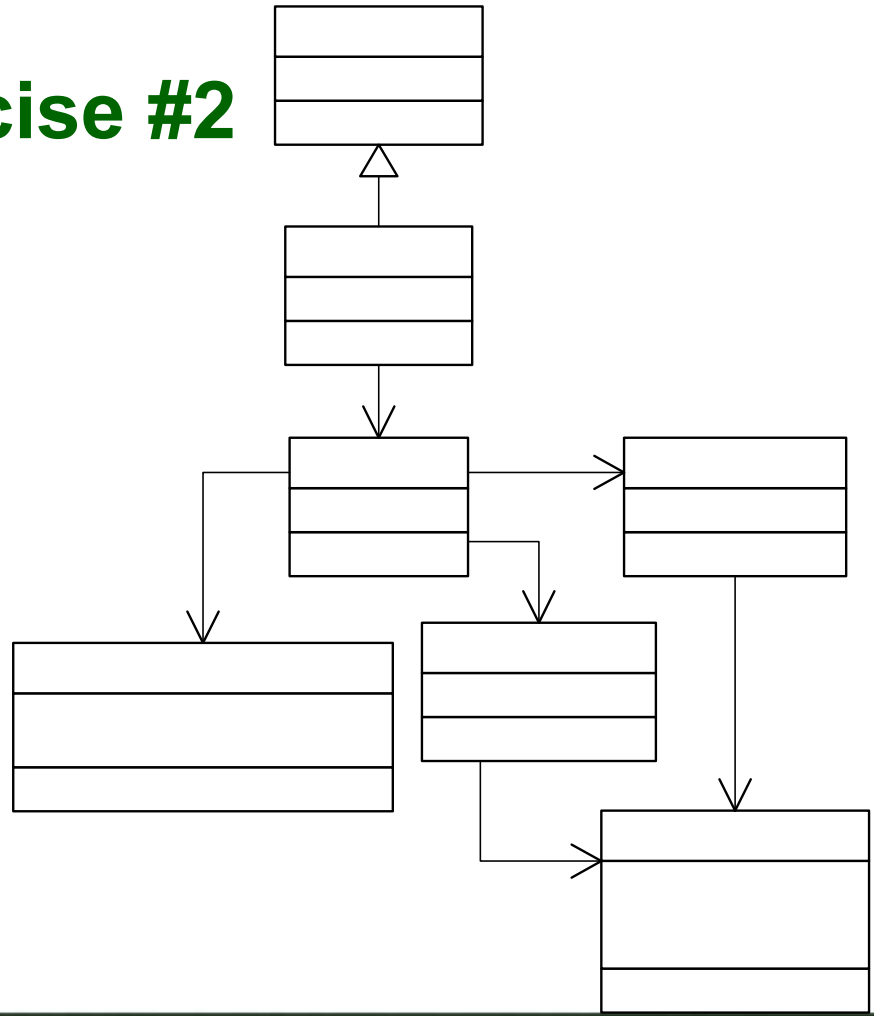
Possible Answer

Business Class	Business Element	NIEM Element	Ext	IEP Path	Notes
Arrest Report		Loc:ArrestReport	X	loc:ArrestReport	Extend DocumentType
Arrest		j:Arrest		loc:ArrestReport/j:Arrest	
Arresting Officer		j:ArrestOfficial		loc:ArrestReport/j:Arrest/j:ArrestOfficial	
Arresting Officer	Badge ID	u:ID		loc:ArrestReport/j:Arrest/j:ArrestOfficial/**j:EnforcementOfficialBadgeID/u:ID**	

Mapping Practical Exercise #2

- Map the following:
  - Arrest date
    - The date that the arrest occurred
  - Location
    - The place that the Arrest took place
  - Location Name
    - The common name associated with a location
  - Environment Condition
    - An Integrated Transportation Information System code for the atmospheric conditions
- **Ensure that any extensions are concrete typed**



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Possible Solution

Business Class	Business Element	NIEM Element	Ext	IEP Path	Notes
ArrestReport	Arrest	loc:Arrest	√	loc:ArrestReport/loc:Arrest/u:ActivityDate	Extend arrest because need to access local extension to Location for concrete typing
Arrest	Date	u:ActivityDate		loc:ArrestReport/loc:Arrest/u:ActivityDate	
Arrest	Location	loc:ArrestLocation	√	loc:ArrestReport/loc:Arrest/loc:ArrestLocation	Extend ArrestLocation to reference local location type for concrete typing
Location	Name	u:LocationName		loc:ArrestReport/loc:Arrest/loc:ArrestLocation/u:LocationName	
Location	Environment Condition	j:IncidentWeatherCode		loc:ArrestReport/loc:Arrest/loc:ArrestLocation/j:IncidentWeatherCode	Include in extension for Location

Summary

- Purpose of mapping
  - To associate exchange model to NIEM
    - Semantic meaning
    - Structure
- Mapping tools
  - Spreadsheets